WHAT IS CLAIMED IS:

1. A method for manufacturing a FBG having improved performances, said method comprising the steps of:
    a) UV-writing a FBG in an optical fiber;
    b) annealing-trimming characteristics of said FBG by performing the sub-steps of:
        i) monitoring characteristic data of said FBG; and
        ii) generating a controlled complex temperature profile along the FBG with a heating means according to said characteristic data for providing an accurate controlled annealing process of the FBG, thereby providing an accurate trimming thereof.

2. The method for manufacturing a FBG having improved performances according to claim 1, wherein said sub-step i) comprises the sub-step of:
    monitoring a slope factor $s(\lambda)$ and a demarcation energy E_d (T, t) of said FBG; and
    wherein, in said sub-step ii), said complex temperature profile is time-controlled according to said slope factor $s(\lambda)$ and said demarcation energy E_d (T, t) until said FBG reaches targeted spectral characteristics.

3. The method for manufacturing a FBG having improved performances according to claim 1, wherein said controlled annealing process comprises a series of isochronal annealing steps of increasing temperature.

4. The method for manufacturing a FBG having improved performances according to claim 2, wherein said step b) comprises the initial calibration phase sub-step of performing a first and a second temperature anneals for calculating initial values of $s(\lambda)$ and E_d (T, t).

5. The method for manufacturing a FBG having improved performances according to claim 1, wherein said heating means comprises a heat source constantly scanned at a high speed along said FBG for providing a position-modulated heating of said FBG, thereby generating said complex temperature profile along said FBG.

6. The method for manufacturing a FBG having improved performances according to claim 5, wherein said heat source is a laser beam.

7. The method for manufacturing a FBG having improved performances according to claim 6, wherein a fluence of said laser beam is adjusted along said FBG in locally controlling a scan speed of said laser beam.

8. The method for manufacturing a FBG having improved performances according to claim 1, wherein said heating means comprises a laser beam constantly scanned at a fixed speed along said FBG, a fluence of said laser beam being adjusted as a function of a position of said laser beam along said FBG, thereby providing said complex temperature profile along said FBG.

9. The method for manufacturing a FBG having improved performances according to claim 1, wherein said heating means comprises a laser beam constantly scanned at a fixed speed along said FBG, said laser beam being oscillated perpendicularly to a longitudinal axis of said FBG with a controlled amplitude for providing said complex temperature profile along said FBG.

10. The method for manufacturing a FBG having improved performances according to claim 5, wherein said heat source is scanned along said FBG with ON/OFF periods for limiting heat diffusion, thereby preventing an over-correction generated by said heat diffusion.

11. The method for manufacturing a FBG having improved performances according to claim 5, wherein said step b) comprises the position-calibration sub-step of performing a low temperature heat scan along said FBG for calibrating a position thereof.

12. The method for manufacturing a FBG having improved performances according to claim 5, wherein said step b) comprises the initial sub-step of performing a low temperature heat scan along said FBG for providing an estimation of cladding mode losses along said FBG.

13. The method for manufacturing a FBG having improved performances according to claim 5, wherein said heat source is a heated air jet mechanically scanned along said FBG.

14. The method for manufacturing a FBG having improved performances according to claim 1, wherein said FBG is a chirped FBG.

15. The method for manufacturing a FBG having improved performances according to claim 1, wherein said FBG is a complex filter.

16. The method for manufacturing a FBG having improved performances according to claim 1, wherein said FBG is a gain flattening filter.

17. The method for manufacturing a FBG having improved performances according to claim 16, wherein said gain flattening filter has a spectral response matching an inverse gain profile of an amplifier within said gain flattening filter is incorporated for flattening a gain of said amplifier.

18. The method for manufacturing a FBG having improved performances according to claim 16, wherein said gain flattening filter has an improved insertion loss error function.

19. The method for manufacturing a FBG having improved performances according to claim 18, wherein said insertion loss error function is smaller than +/- 0.15 dB.

20. The method for manufacturing a FBG having improved performances according to claim 1, wherein said FBG is UV-written with provision for the annealing-trimming step for allowing to reach a post annealing target.

21. An annealing-trimming apparatus for manufacturing a FBG having improved performances, said apparatus comprising:

- an analysing means operatively connected to a UV-written FBG provided in an optical fiber for monitoring characteristic data of said FBG;
- a processing means operatively connected to said analysing means for processing said characteristic data;
- a heating means operatively connected to said processing means for generating a controlled complex temperature profile along said FBG according to said characteristic data, thereby providing an accurate annealing-trimming of said FBG.

22. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said analysing means comprises:

- a light source for launching a light beam into said UV-written FBG; and
- an optical spectral analyser for analysing the light beam exiting from said UV-written FBG, thereby providing characteristic data.

23. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said heating means comprises a heating wire extending along said FBG.

24. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said heating means comprises a plurality of controllable heating devices distributed in close proximity along said FBG, each of said heating devices being independently controlled by said processing means for generating said complex temperature profile along said FBG.

25. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said heating means comprises a heated air jet mechanically scanned along said FBG.

26. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said heating means comprises:

- a heat source for allowing an annealing of said UV-written FBG; and
- a X-Y scanner operatively connected to each of said processing means and heat source, said X-Y scanner being controlled by said processing means according to characteristic data for scanning said heat source along said FBG, thereby applying said complex temperature profile along said FBG.

27. The annealing-trimming apparatus for manufacturing a FBG according to claim 26, wherein said heat source is a laser.

28. The annealing-trimming apparatus for manufacturing a FBG according to claim 27, wherein said laser is a CO2 laser.

29. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said processing means is a computer.

30. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said FBG is a chirped FBG.

31. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said FBG is a complex filter.

32. The annealing-trimming apparatus for manufacturing a FBG according to claim 21, wherein said FBG is a gain flattening filter.

33. The annealing-trimming apparatus for manufacturing a FBG according to claim 32, wherein said gain flattening filter has a spectral response matching an inverse gain profile of an amplifier within said gain flattening filter is incorporated for flattening a gain of said amplifier.

34. The annealing-trimming apparatus for manufacturing a FBG according to claim 32, wherein said gain flattening filter has an improved insertion loss error function.

35. The annealing-trimming apparatus for manufacturing a FBG according to claim 34, wherein said insertion loss error function is smaller than +/- 0.15 dB.